CS 206 Data Structures Spring 2014

Homework 2

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Note 1: Discussion with others is encouraged.

Note 2: However, the final write-up and programs must be your own work.

(Copying of part or the whole of others' work and/or programs will be checked by the TAs and/or computer programs.)

Note 3: Homework should be submitted through KLMS and is due at midnight of the due date.

Note 4: You may use any programming language of your choice for programming.

(However, once you use one programming language, use the programming language and the same version throughout the semester.) When you submit programs, always include the following information:

(1) which version of what programming language is used

(2) sample runs of programs with sample test data

(3) instructions on how to run the programs

(Missing any of this information may result in deduction of points.)

Note 5: Since the purpose of this homework is to exercise developing and implementing ADTs, you should NOT use any ADT from a library of the programming language that you use.

1. (a) Specify an integer stack ADT that can push and pop integers.

   (b) Implement the ADT specified in (a).

   (c) Write a program that takes as input an arithmetic expression in a fully parenthesized infix form, evaluates the expression and prints it out.

   (You can assume that there are only four operations: +, –, * and / where / is an integer division that discards the fractional part of the operation result and that the operands are all integers.)

   Example) Input "((3+5) * ((16/3) – 2))" evaluates to "24".

2. (a) Specify a priority queue ADT for airline flight reservation, which has only three different priorities, i.e first-class, business-class and economy-class.
   (b) Implement the ADT specified in (a).
   (c) Write a program that takes as input a sequence of reservation requests in the form of

   (“Adam Smith”, 3) (“John Galbraith, 2) (“Joseph Schumpeter”, 2)(“John M. Keynes, 1) ...

   where 1 stands for first-class, 2 for business-class and 3 for economy-class, and prints out the reservation requests in the order of their priorities on the first-come first-served basis. Therefore for the above example input, the output should be

   (“John M. Keynes, 1)(“John Galbraith, 2)(“Joseph Schumpeter”, 2)(“Adam Smith”, 3) ...